Effect of Intervention Program on Nurses' Performance Regarding Care of Patients with Heart Failure

Mahmoud Hassan Mohamed[1], Tahany Ahmed El Senousy[2], Dina Mohamed Maarouf[3]

(1)   Assistant lecturer of Critical Care Nursing _Faculty of Nursing – Ain Shams University, Egypt
(2)   Professor of Critical Care Nursing _ Faculty of Nursing – Ain Shams University, Egypt
(3)   Assistant professor of Critical Care Nursing, Faculty of Nursing- Ain Shams University, Egypt

Abstract

Background: Heart failure (HF) is a chronic condition that affects a significant number of patients worldwide, requiring specialized management. Nurses have a great role in caring of such group of patients. **Aim:** The study aimed to investigate the effect of intervention program on nurses caring of patients with heart failure, at the Cardiac Care Unit (CCU). **Method:** A quasi-experimental research design was utilized in this study. The study included 30 nurses working at the Cardiac Care Unit. For data collection, two different tools were used. **Tool I**: A Structured interview Knowledge Questionnaire; **Tool II**: Nurses' Observational Checklist. **Results**: The study results showed significant differences pre and post implementation of the intervention program regarding nurses' level of knowledge and practice compared to their pre-intervention levels with (p = 0.00). **Conclusion**, the results of this study concluded that the implementation of the intervention program revealed a significant positive improvement of nurses' knowledge and practice level regarding care of patients with heart failure. **Recommendation**, conducting in-service training programs for nurses caring patients with heart failure is recommended to keep them up to date with the latest information and evidence-based practices that related to care of patients with HF.

Key words: Intervention program, nurses, heart failure.

Introduction

Heart failure (HF) is a clinical syndrome that could be manifested as both acute and chronic conditions resulting from structural or functional abnormalities in the heart. This condition significantly impairs patients' functionality and quality of life, and it is associated with high rates of morbidity, mortality, and rehospitalization **(Ketilsdottir et al., 2019)**.

The growing burden of HF on the healthcare system is a major concern due to the significant increase in its prevalence. Estimated studies suggested that HF prevalence will rise by 46% from 2012 to 2030 and reach to 1.5 million cases annually by 2040. Additionally, healthcare expenditure about HF expected to increase significantly, with projections indicating a 127% escalation by 2030 **(Virani et al., 2020)**.

The American Heart Association (AHA) estimated that a patient with HF could cost around 5380 US dollars/ year. So, the current worldwide burden cost of patients with HF could be around 346.17 billion US dollars per year **(Benjamin et al., 2019)**.

Since the 1990s, cardiovascular disease (CVD) was the primary cause of death in Egypt. In 2017, it accounted for 46.2% among the overall mortality cases in the country. So, public health concerns about HF were significantly increasing in Egypt, additionally to that the burden of CVD **(Global Health Estimates, 2020; Hassanin et al., 2020)**.

As educators, nurses play a critical role in improving patient outcomes by

providing self-care education on various aspects such as activity, medications, diet, fluid control, lifestyle modifications, symptom monitoring and management. This education, along with follow-up support, could help reduce hospital readmissions, morbidity, and mortality, as well as improve patients' quality of life **(Mattina et al., 2021; Tinoco et al., 2021)**.

Researchers showed that nurses' knowledge related to HF disease processes, medications, and lifestyle was inadequate, resulting in the insufficient provision of self-care information to patients during and after their hospital stay **(Krówczyńska & Jankowska-Polańska, 2022; Chi et al., 2022)**. Nurses need to have sufficient knowledge and practice skills to deliver optimal care to patients with heart failure. In recent years, educational programs had been designed to strengthen nurses' abilities in managing patients with heart, resulting in better patient outcomes **(Awoke et al., 2019; Collins et al., 2021)**.

So, the present study will be contributed to the growing body of evidence on the implications of a HF intervention program on nurses' knowledge and practice in a CCU setting. This research will provide valuable insights about the potential benefits of such programs in improving the nursing care of patients with heart failure.

Aim Of The Study:

This study aims to evaluate the effect of intervention program on nurses' performance regarding caring of patients with heart failure through the following:

1. Assessing of nurses' knowledge and practice.
2. Planning and implementing heart failure intervention program for nurses.
3. Evaluating effect of heart failure intervention program for nurses on

their knowledge and practice regarding care of patient with heart failure.

Research Hypothesis:

The current study hypothesized that:

Intervention program for nurses caring of patients with heart failure will lead to significant positive effect on their knowledge and practice.

Subject And Methods

Subjects and methods for this study were portrayed under the four main designs as follow:

1. Technical design.
2. Operational design.
3. Administrative design.
4. Statistical design.

1. Technical design

The technical design includes research design, setting, subjects and tools for data collection.

Research Design:

A quazi-experimental design was utilized for the conduction of this study.

Subject: The study included a convenient sample of all available nurses working in CCUs during the data collection period (30 nurses) caring of patients with heart failure.

Setting: The study was conducted at the cardiac care unit (CCU) in Ain Shams Specialized hospital affiliated to Ain Shams University (It locates at B floor and contains 21 single room and one nurse counter with a central station connected with all patients' rooms).

Tools for data collection: -

Tool (I): A Structured interview Knowledge Questionnaire:

- The researcher designed this tool to assess nurses' caring of patients with heart failure knowledge after reviewing the resent related literature **(Sundel & Ea, 2018; Billings & Hensel, 2019; Silvestri & Silvestri, 2019)**, it was developed in simple English language and included the following components:

- **Part 1: - Nurses demographic data:** It was used to assess demographic data of studied Nurses including age, qualifications, gender, marital status, years of experience, and training courses related to caring for patients with HF.
- **Part 2: - Nurses knowledge assessment sheet** it was used to assess nurses' knowledge about HF across nine domains, including anatomy and physiology of the heart, pathophysiology, types/classification, risk factors, causes, signs/symptoms, diagnostic measures, complications, medical and nursing management. The tool included total of 49 items.
     - **Scoring system;**
- It gives one mark for each correct answer and 0 for each wrong answer. Nurses' total knowledge scores were calculated and classified as either satisfactory (85% or more) or unsatisfactory (less than 85%).

Tool (II): Nurses' Observational Checklist:
   - The researcher developed this tool to evaluate nurses' practices for patients with HF before and after implementation of the intervention program. The tool was developed after reviewing the resent related literature **(Peate, Wild, 2018; Perry, Poter, 2019; Perry et al., 2021)**. It covered two main domains.
   -a) Assessment of patients with HF includes 52 sub-items related to the assessment of vital signs: status of cardiovascular, respiratory, neurological, integumentary, gastrointestinal, psychological, fluid & electrolyte, as well assess pain, edema, and activities of daily living.
   - b) Care of patients with HF includes 141 sub-items related to applying a cardiac monitor, oxygenation, electrocardiogram (ECG), central

venous pressure monitoring, urinary catheter care, urinary catheter removal, pain management, IV infusions of high-alert medications, anxiety reduction, pressure ulcer preventive measures, and infection prevention measures.

-**scoring system.**
   - The Nurses' Observational Checklist assigned 1 score for steps that were correctly done, and 0 for steps that were done incorrectly or not done at all. The total scores for nurses' skills were calculated. Scores below 85% were considered unsatisfactory level of performance, while scores of 85% or higher were considered satisfactory level.

2. Operational design
-     It included preparatory phase, validity and reliability, pilot study and field work.
- **Preparatory phase:**
- It included the reviewing of current and past, national, and international related literature and theoretical knowledge of various aspects of the study using books, articles, internet, periodicals and magazines to get acquainted with the research problem to develop the study tools for data collection and the content of the program.
   - The researcher designed an intervention program for the care of patients with HF based on nurses needs identified during the assessment stage.
- **Validity and reliability tools**
- **validity**
- Five experts from the Department of Critical Care and Emergency Nursing, including two professors and three assistant professors, were consulted to evaluate the clarity and appropriateness of the knowledge assessment questionnaire, observational checklist, and heart failure intervention program.

Following their assessment, the final versions of the tools and program were released.

- **Reliability testing** of Tool 1 (structured knowledge questionnaire) and Tool 2 (Nurses' observational checklist) were tested using Cronbach's coefficient alpha, resulting in values of 0.783 and 0.811, respectively.
- **Pilot Study:**
- It was done on (10% of the study sample) three nurses to assess the applicability and feasibility of the tools. Also, to estimate time needed to fill in the study tools. No modifications were done.
- The nurses who selected for piolet study were included in the study subjects.

Ethical Considerations:
- Before beginning the study, the faculty of nursing's ethical committee approved the research. The researcher explained the study's aims and goals to the nurses involved. The studied nurses provided written consent to participate in the study, and the researcher emphasized the importance of anonymity, confidentiality, voluntary participation, and the right to withdraw from the study at any time.

- **Field work:**
- Field work included assessment, planning phase, implementation phase and evaluation phase.
- Data collection and application of the intervention program lasted over a period of six months, started from April 2022 and ending in September 2022.

A- The assessment and planning phase:
- The researcher assessed the nurses' practice using Tool II, nurses' observational checklist, followed by administering the structured knowledge questionnaire. This approach aimed to ensure maximum realistic observations of the nurses' practices and minimize the possibility of contamination.

- The researcher observed each nurse while they care for patients with HF. Assessments were carried out twice a week, in the morning and afternoon shifts before implementation of the nursing intervention program.
- The 30 nurses took about 9 weeks to be observed by the researcher.
- Then, Knowledge assessment questionnaire was used to assess nurses' level of knowledge regarding care of patients with heart failure. This tool was filled by the studied nurses in the stated shifts; it took about 35-50 minutes for each nurse.

B- Implementation phase
- This phase took about (6 weeks).
- The researcher conducted the intervention program for the studied nurses caring for patients with HF in the selected setting. Nurses in the intervention group were divided into six subgroups (five in each), the education sessions were organized to be during the morning and evening shifts to ensure that all nurses could attend at the time suitable for them.
- The intervention program consisted of four sessions, with two hours for the theoretical part and another two hours for the practical sessions to cover the program content. Each education session lasted from 45-60 minutes and followed by a 15-minute discussion. The information was delivered through using videos, pictures, and computer presentations.
- The educational part including, anatomy, and physiology of the heart, an overview about heart failure were also taught, including pathophysiology, classification, types, risk factors, causes, signs & symptoms, diagnostic tests, complications, pharmacological management, nursing care, and discharge instructions. The practical part including skills related to, applying cardiac monitor, oxygenation, Electrocardiogram (ECG),

Central venous pressure monitoring, urinary catheter care, urinary catheter removal, pain management, IV infusions of high alert medications, anxiety reduction, pressure ulcer preventive measures, and infection prevention measures.

- Various training methods were utilized during the educational sessions, including lectures, question-and-answer techniques, group discussions, demonstrations and redemonstrations.

C-Evaluation phase

- After the program was implemented, an evaluation process was conducted immediately to assess its effect on nurses' knowledge and practice using Tools I and II.
  - The 30 nurses took about 9 weeks to be evaluated by the researcher.

3. Administrative design:

- Formal letter was issued and approval to carry out this study was obtained from the dean of the Faculty of Nursing and directors of Ain Shams University Specialized Hospital. Consent was obtained for data collection after explaining the purpose of the study.

4- Statistical design:

- The collected data were organized, analyzed using appropriate statistical significance tests. The data were collected, coded and entered into computer. The data were analyzed by program using the statistical package for social science (SPSS).

- The tests used to summarize data and scores used to compare scores of numerical data were; range, mean, standard deviation, Chi square, P-Value, t-test. Also, Cronbach`s alpha used to test reliability of tools, and factor analysis to test its validity. Also, a test of significance was used and regarding the significance of the results, the observed differences and associations were considered as follow:

- Non- significant P>0.05
- Significant P<0.05
- Highly significant P<0.01

Results

Table (1) represented the distribution of the studied nurses concerning to their demographic characteristics. With a mean age of 31.77 ± 5.77 years old, half of the nurses (50%) were between the ages of 30 and 40 years old. More than half of them (53.3%) had from 5 to 10 years of experience in the CCU, and the majority (76.7%) were female. While 70% of the nurses were married, and 83.3% had a bachelor's degree in nursing. Furthermore, the majority (80%) of them had not attended any training courses related care of patients with HF within the previous 6 months.

Table (2) showed that nurses' knowledge regarding management of patients with heart failure was increased significantly after implementing of the nursing intervention program with (Mean ± SD equal 44.16 ± 3.51) compared to the pre-intervention program (Mean ± SD 34.23 ± 5.75) with a P-value of 0.00.

Figure (1) reported that the total satisfactory level of nurses' knowledge regarding care of patients with heart failure was significantly improved post the intervention program implementation compared to pre the satisfactory level (80% versus 16.7%).

Table (3) revealed that the mean practice scores of nurses during the assessment and management stage of patients with heart failure increased immediately post implementing of the intervention program compared to the pre-intervention program. With (Mean ± SD equal 99.13±3.41 versus 94.90±4.98 respectively) with significantly statistical differences observed where P=0.00.

Figure (2) represented that total studied nurses' practice satisfactory level

regarding care of patients with heart failure significantly improved post the intervention program implementation compared to pre-program (83.3% versus 30%).

Table (4) illustrated that, there was a significant statistically positive correlation between nurses' knowledge and their practice regarding the care of patients with heart failure post-intervention program implementation.

Table (1): Number & percentage distribution of demographic distribution of the studied nurses.

Items	No.	%
Age (years)		
20-< 30	12	40.0
30-< 40	15	50.0
≥ 40	3	10.0
Mean ± SD= 31.77 ± 5.77		
Gender		
Male	7	23.3
Female	23	76.7
Educational level		
Baccalaureate degree	25	83.3
Diploma	3	10.0
Master's degree	2	6.7
Doctorate	0	0.0
Years of experience		
1 - < 5 years	5	16.7
5 - < 10 years	16	53.3
≥10 years	9	30.0
Marital Status		
Married	21	70.0
Single	9	30.0
Attended any training courses related to HF within the last 6 months		
Yes	6	20.0
No	24	80.0

SD, standard deviation; HF, heart failure.

Table (2): Nurses' knowledge regarding management of heart failure pre- and post the intervention program.

| Knowledge subscales | Pre | | | | Post | | | | X^2 | P-value |
| | Satisfactory | | Unsatisfactory | | Satisfactory | | Unsatisfactory | | | |
	No.	%	No.	%	No.	%	No.	%		
Anatomy and Physiology of the Heart	8	26.7	22	73.3	19	63.3	11	36.7	22.88	0.000*
Pathophysiology of heart failure	7	23.3	23	76.7	25	83.3	5	16.7	21.29	0.000*
Types/classification of heart failure	4	13.3	26	86.7	16	53.3	14	46.7	10.80	0.001*
Risk factors/causes of heart failure	16	53.3	14	46.7	21	70.0	9	30.0	1.111	0.292
Signs & symptoms of heart failure	4	13.3	26	86.7	19	63.3	11	36.7	15.86	0.000*
Complications of heart failure	17	56.7	13	43.3	28	93.3	2	6.7	10.75	0.000*
Diagnostic measures of heart failure	12	40.0	18	60.0	25	83.3	5	16.7	11.91	0.001*
Medical management of heart failure	5	16.7	25	83.3	23	76.7	7	23.3	21.69	0.000*
Nursing management of heart failure	3	10.0	27	90.0	24	80.0	6	20.0	29.69	0.000*
Nutritional needs	7	23.3	23	76.7	24	80.0	6	20.0	19.28	0.000*
Total knowledge score	**5**	**16.7**	**25**	**83.3**	**24**	**80.0**	**6**	**20.0**	**24.09**	**0.000***
Mean ± SD	**34.23±5.75**				**44.16±3.51**				**T=12.5**	**0.000***

X2: Chi Square Test. t=Paired t.test. No significant at p >0.05. (*) statistically significant at p < 0.05.
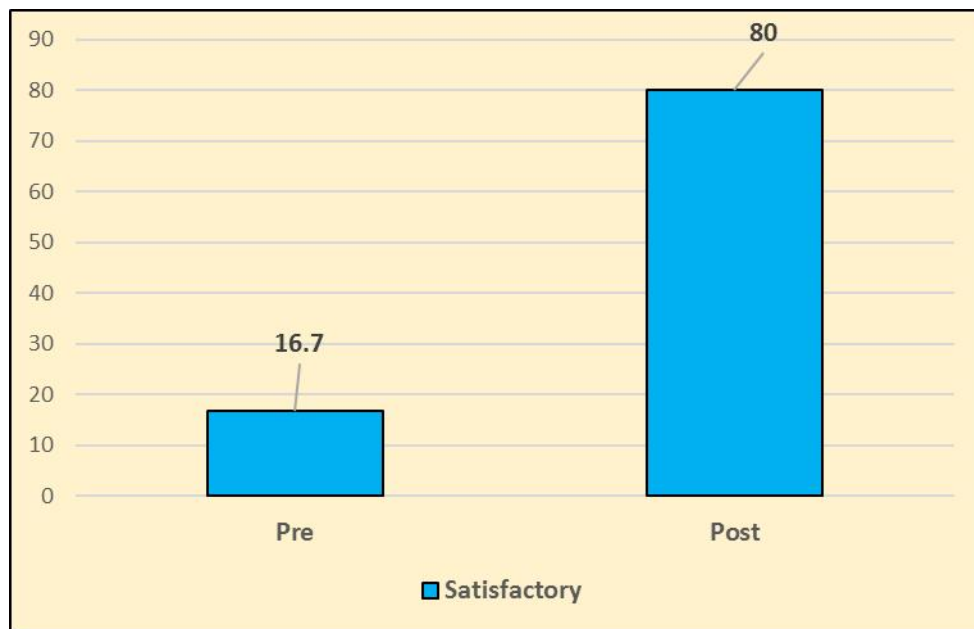
Figure (1): Percentage distribution of the studied nurses' total satisfactory knowledge regarding care of patients with heart failure pre and post the intervention program implementation **(n=30).**

Table (3) Nurses' practice regarding management of heart failure pre- and post-intervention program.

Practice subscales	Pre				Post				X²	P-value
	Satisfactory		Unsatisfactory		Satisfactory		Unsatisfactory			
	No.	%	No.	%	No.	%	No.	%		
Assessment of patients with heart failure	26	86.7	4	13.3	30	100.0	0	0.0	4.286	0.038*
Care of patients with heart failure	5	16.7	25	83.3	24	80.0	6	20.0	24.09	0.000*
Total practice	**9**	**30.0**	**21**	**70.0**	**25**	**83.3**	**5**	**16.7**	**17.37**	**0.000***
Mean ± SD		**336.8±21.5**				**371.6±27.2**			**T=8.410**	**0.000***

X2: Chi-Square Test. t=Paired t.test. (*) Statistically significant at p <0.05.
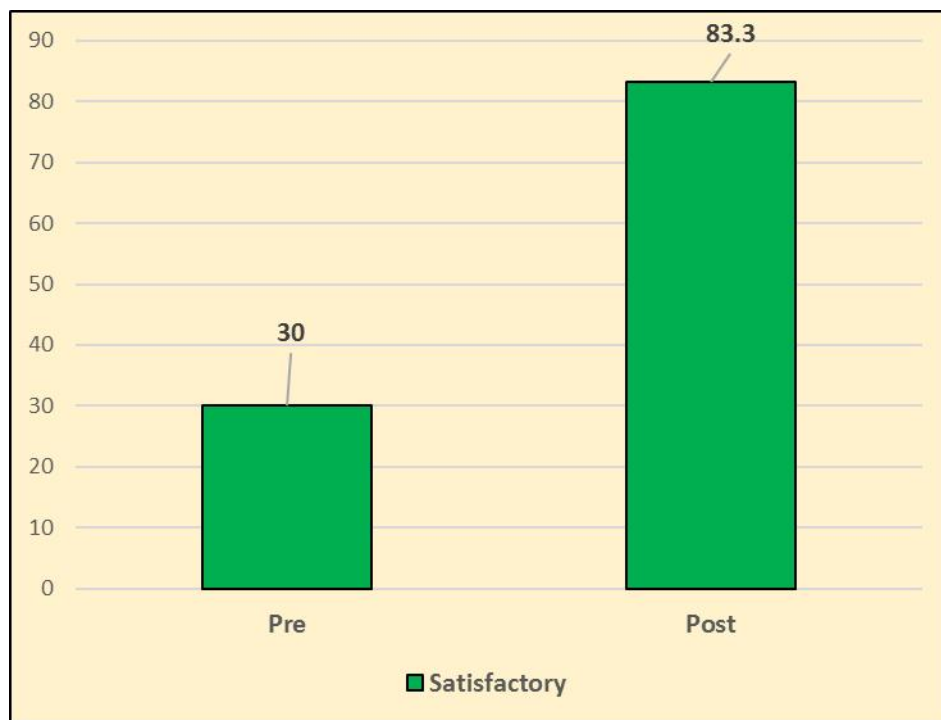
Figure (2): Percentage distribution of the studied nurses' total practice regarding care of patients with heart failure pre and post intervention program implementation**.**

Table (4) Correlation between total nurses' knowledge and practice regarding care of patients with heart failure pre and post intervention program implementation.

Variables		Total nurses' practice	
		Pre	Post
Total nurses' knowledge	R	0.690	0.542
	p	0.000*	0.000*

R= Pearson correlation coefficient test.   P= p-value   * Statistically significant at p < 0.05.

Discussion

Regarding the studied nurse's demographic characteristics, the finding of the current study showed that half of nurses were between the ages of 30 to 40 years old with a mean age of 31.77 ± 5.77 years. From the researcher point of view this may be due to working as a cardiac care unit nurse requires to gain a significant experience and expertise. This finding is consistent with the finding of a study done by **Davisson and Swanson (2020)**, entitled: "Nurses' heart failure discharge planning part I: The impact of interdisciplinary relationships and patient behaviors" who reported that, the studied nurses' mean age was 33 years old.

As regards gender the present study revealed that more than three quarters of the studied nurses were females, The higher percentage of female nurses might be due to the increased in the number of female nurses as compared to males among the Egyptian society. This finding is consistent with a study done by **Fares and Maghraby (2019)** entitled: "Effect of an Educational Program on Nurses' knowledge & Practices Regarding Assessment of Acute Coronary Syndrome" and reported that, the majority of studied nurses were females.

Concerning the educational level of the studied nurses, the current study results showed that the majority of nurses had a bachelor's degree in nursing, this could be explained as all staff at cardiac care unit, at

Ain Shams Specialized hospital to be employed must had a bachelor's degree. This finding is consistent with a study done by **Davisson and Swanson (2020)**, who reported that the majority of studied nurses had a bachelor's degree in nursing.

Regarding years of experience at cardiac care unit, the current study results revealed that more than half of the studied nurses had from 5 to 10 years of experience in CCU, it may be attributed that the majority of the studied nurses possed baccalaureate degree nurses. This result is consistent with the findings of a study done by **Richmond (2014)** entitled: "Exploring Nurses' Knowledge about Heart Failure Before and after the Implementation of a Heart Failure Education Program" who reported that the majority of the studied nurses had more than 6 years of experience.

Regarding to the marital status, it was found that more than two-thirds of the studied nurses were married. These results are in line with the finding of a study done by **Fares and Maghraby's (2019)** who reported that most of nurses (90%) were married.

Concerning training courses regarding nursing care of patients with heart failure the current study result revealed that, the majority of nurses had not attended any HF-related training courses within the last 6 months. This result might reflect the lack of in-service training programs, in spite of the importance of training courses to

improve nurses' performance that affect positively on patients' outcomes. This study finding agreed with the finding of a study done by **KRÓWCZYŃSKA & Jankowska-Polańska (2022)** entitled "Polish Nurses' Knowledge of Heart Failure Self-Management Principles" and reported that the majority of nurses (83%) had not attended any training courses concerning management of patients with HF.

Regarding total nurses' knowledge, the results of the current study indicated that, the mean knowledge score regarding care of patients with HF was significantly increased post implementation of the intervention program from 34.23±5.75 pre-intervention program to 44.16±3.51 post-program implementation. This finding indicated that the intervention programs could be an effective method for increasing nurses' level of knowledge regarding care for patients with HF. These results could be attributed to the motivation, cooperation, and support of the hospital management to the studied nurses' to become at high educational level.

These findings align with the findings of a study done by **Mahramus et al. (2014)**, entitled: "Assessment of an educational intervention on nurses' knowledge and retention of heart failure self-care principles and the Teach Back method" and discovered a lack of knowledge regarding management for patients with HF among nurses prior to participation in the educational intervention program. In addition, they found significant differences between pretest (65.1%) and post-test (80.6%) scores with (p 0.001).

There is also an agreement with the finding of a study done by **Sundel and Ea (2018)**, entitled: "An Educational Intervention to Evaluate Nurses' Knowledge of Heart Failure" who found that, an education intervention about care principles of patients with HF resulted

significant improvement of the nurses' knowledge level. Similarly, the finding of a study done by **Mattina et al. (2021)** entitled: "The Impact of Nurse Education on Heart Failure Readmissions and Patient Education" and reported that educational intervention program improved nurses' knowledge level from (69.7%) in the pretest to (100%) scores in the post-test with (p < .001) regarding care of patients with HF.

This result also goes with, the finding of a study done by **KRÓWCZYŃSKA and Jankowska-Polańska (2022)** who mentioned that the nursing practitioners' knowledge level was inadequate. So, nurses required more in-depth learning and understanding about the caring principles of patients with HF through educational interventions and postgraduate training courses.

Concerning studied nurses' practice level toward care of patients with HF, the current study finding revealed that there was a statistically significant difference between nurses' total practice mean scores before program implementation (94.90±4.98) and after the intervention program implementation (99.13±3.41), as indicated by a p-value of 0.00. The inadequate level of practice could be attributed to the increased number of patients, workload, and inadequate nurses' knowledge regarding the management of patients with HF.

These findings are consistent with the finding of a study done by **Hamed and Yassein (2020)**, entitled: "Effect of Training Program on Internship Nurses' Performance Regarding Congestive Heart Failure Patients" and observed that most of the intern nurses (97%) had below and average total practice scores before the implementation of the training program about care of patients with HF, however, after implementing of the the program, over two-thirds (69%) of the studied nurses

had a satisfactory practice score with P= 0.001.

Also, in accordance the finding of a study done by **Ghonem et al. (2022)**, entitled: "Effect of Educational Program on Nurses' Knowledge and Practice Regarding Thrombolytic Therapy among Patients with Acute Myocardial Infarction" who found that, the post-intervention practice of the studied nurses was satisfactory. Based on the study findings, the hypothesis of the current study approved that there is a statistically significant difference between nurses' knowledge and practice scores pre- and post the implementation of the intervention program about care of patients with HF.

Regarding the correlation between total nurses' knowledge and practice regarding care of patients with heart failure pre and post intervention program implementation, the current study results revealed that there was a significant statistically positive correlation between nurses' knowledge and their practice regarding care of patients with heart failure post-intervention program implementation. This means that improving nurses' knowledge through in service training affect positively on their practice regarding care for patient with HF. This was in harmony with the finding of a study done by **Elsebai et al (2022)**, who revealed that there was a significant statistically positive correlation between nurses' knowledge and their practice.

Also, this study result is in concordance with the finding of a study done by **Hamed & Yassein (2020)**, who clarified that, there was a significant statistically positive correlation between nurses' knowledge and their practice.

Conclusion
The results of this study concluded that:
The implementation of the intervention program revealed a significant positive improvement of nurses' knowledge and practice level regarding care of patients with heart failure.

Recommendations
- Conducting in-service training programs for nurses caring patients with heart failure is recommended to keep them up to date with the latest information and evidence-based practices that related to care of patients with HF.
- Replication of the current study on larger probability sample and different hospitals settings is recommended to evaluate the impact of the intervention program about car of patients with heart failure on nurses' performance and consequently on patients' outcomes.
- Further research about the factors that influencing the outcomes of patients with heart failure is suggested to enhance the quality of care provided to such group of patients.

References

- **Awoke, M. S., Baptiste, D. L., Davidson, P., Roberts, A., & Dennison-Himmelfarb, C. (2019)**. A quasi-experimental study examining a nurse-led education program to improve knowledge, self-care, and reduce readmission for individuals with heart failure. Contemporary nurse, 55(1), 15–26. https://doi.org/10.1080/10376178.2019.1568198

- **Benjamin, E. J., Muntner, P., Alonso, A., Bittencourt, M. S., Callaway, C. W., Carson, A. P., Chamberlain, A. M., Chang, A. R., Cheng, S., Das, S. R., Delling, F. N., Djousse, L., Elkind, M. S. V., Ferguson, J. F., Fornage, M., Jordan, L. C., Khan, S. S., Kissela, B. M., Knutson, K. L., Kwan, T. W., … American Heart Association Council on Epidemiology and Prevention Statistics Committee and Stroke Statistics Subcommittee (2019)**. Heart Disease and Stroke Statistics-2019

Update: A Report From the American Heart Association. Circulation, 139(10), e56–e528. https://doi.org/10.1161/CIR.00000000 00000659

- **Billings DM, Hensel D. Lippincott Q&A Review for NCLEX-RN (Lippincott's Review For NCLEX-RN)(2019)**.13th ed. Wolters Kluwer.

- **Chi, S. Y., Soh, K. L., Raman, R. A., Ong, S. L., & Soh, K. G. (2022)**. Nurses' knowledge of heart failure self-care education: A systematic review. Nursing in critical care, 10.1111/nicc.12758. Advance online publication. https://doi.org/10.1111/nicc.12758

- **Collins, S. P., Liu, D., Jenkins, C. A., Storrow, A. B., Levy, P. D., Pang, P. S., Chang, A. M., Char, D., Diercks, D. J., Fermann, G. J., Han, J. H., Hiestand, B., Hogan, C., Kampe, C. J., Khan, Y., Lee, S., Lindenfeld, J., Martindale, J., McNaughton, C. D., Miller, K. F., … Butler, J. (2021)**. Effect of a Self-care Intervention on 90-Day Outcomes in Patients With Acute Heart Failure Discharged From the Emergency Department: A Randomized Clinical Trial. JAMA cardiology, 6(2), 200–208. https://doi.org/10.1001/jamacardio.202 0.5763

- **Davisson, E., & Swanson, E. (2020)**. Nurses' heart failure discharge planning part I: The impact of interdisciplinary relationships and patient behaviors. Applied nursing research: ANR, 56, 151337. https://doi.org/10.1016/j.apnr.2020.151 337

- **Elsebai, H. A., Ragheb, M. M., & Ghonaem, S. E. (2022).** Effectiveness of an Educational Program for Management of Patients Undergoing Permanent Pacemaker on Nurses' Performance. Journal of Nursing

Science - Benha University. Vol. (3) No. (1). ISSN 2682 – 3934.

- **Fares, S.A., & Maghraby M. H. (2019)**. Effect of an Educational Program on Nurses' knowledge &Practices Regarding Assessment of Acute Coronary Syndrome. Assiut Scientific Nursing Journal. , 7(19), 19:108-116. doi: 10.21608/asnj.2019.74111

- **Ghonem, G. E., Mohamed, Y. M., Gaballah, S. H., & Hassan, M. S. (2022)**. Effect of Educational Program on Nurses' Knowledge and Practice Regarding Thrombolytic Therapy among Patients with Acute Myocardial Infarction. American Journal of Nursing Research, 10(2), 58-66. DOI: 10.12691/ajnr-10-2-3

- **Global health estimates 2014 summary tables: Estimated deaths by cause, sex and WHO Member State 2012. Geneva: World Health Organization; 2014.** http://www.who.int/healthinfo/global_ burden_disease/estimates/en/index1.ht ml. Accessed 4 Mar 2020.

- **Hamed, L. A., & Yassein, N. H. (2020)**. Effect of Training Program on Internship Nurses' Performance Regarding Congestive Heart Failure Patients. IOSR Journal of Nursing and Health Science. 9(6), 58-68. doi: 10.9790/1959-0906035868

- **Hassanin, A., Hassanein, M., Bendary, A., & Maksoud, M. A. (2020)**. Demographics, clinical characteristics, and outcomes among hospitalized heart failure patients across different regions of Egypt. The Egyptian heart journal : (EHJ) : official bulletin of the Egyptian Society of Cardiology, 72(1), 49. https://doi.org/10.1186/s43044-020-00082-0

- **Ketilsdottir, A., Ingadottir, B., & Jaarsma, T. (2019)**. Self-reported

health and quality of life outcomes of heart failure patients in the aftermath of a national economic crisis: a cross-sectional study. ESC heart failure, 6(1), 111–121. https://doi.org/10.1002/ehf2.12369

- **Krówczyńska, D., & Jankowska-Polańska, B. (2022)**. Polish Nurses' Knowledge of Heart Failure Self-Management Principles. International journal of environmental research and public health, 19(3), 1327. https://doi.org/10.3390/ijerph19031327

- **Mahramus, T., Penoyer, D. A., Frewin, S., Chamberlain, L., Wilson, D., & Sole, M. L. (2014)**. Assessment of an educational intervention on nurses' knowledge and retention of heart failure self-care principles and the Teach Back method. Heart & lung : the journal of critical care, 43(3), 204–212. https://doi.org/10.1016/j.hrtlng.2013.11.012

- **Mattina, K., Dabney, B. W., & Linton, M. (2021)**. The Impact of Nurse Education on Heart Failure Readmissions and Patient Education. Journal of doctoral nursing practice, JDNP-D-19-00076. Advance online publication. https://doi.org/10.1891/JDNP-D-19-00076

- **Peate L, Wild K. Nursing Practice Knowledge and Care (2018)**. 2nd ed. WILEY Blackwell.

- **Perry AG, Poter PA, Ostendorf WR. (2021)**. Clinical Nursing Skills and Techniques. 10th ed. Elsevier.

- **Perry AG, Poter PA. Mosbys (2019)**. Pocket Guide to Nursing Skills & Procedures. 8th ed. Elsevier.

- **Richmond, S. H. (2014)**. Exploring Nurses' Knowledge about Heart Failure Before and after the Implementation of a Heart Failure Education Program. Master's Theses, Dissertations, Graduate Research and Major Papers Overview. 245. https://digitalcommons.ric.edu/etd/245

- **Silvestri LA, Silvestri AE (2019)**. Saunders comprehensive review for the NCLEX-RN examination. 8th ed. Elsevier.

- **Sundel, S., & Ea, E. E. (2018)**. An Educational Intervention to Evaluate Nurses' Knowledge of Heart Failure. Journal of continuing education in nursing, 49(7), 315–321. https://doi.org/10.3928/00220124-20180613-07

- **Tinoco, J. M. V. P., Figueiredo, L. D. S., Flores, P. V. P., Padua, B. L. R., Mesquita, E. T., & Cavalcanti, A. C. D. (2021)**. Effectiveness of health education in the self-care and adherence of patients with heart failure: a meta-analysis. Revista latino-americana de enfermagem, 29, e3389. https://doi.org/10.1590/1518.8345.4281.3389

- **Virani, S. S., Alonso, A., Benjamin, E. J., Bittencourt, M. S., Callaway, C. W., Carson, A. P., Chamberlain, A. M., Chang, A. R., Cheng, S., Delling, F. N., Djousse, L., Elkind, M., Ferguson, J. F., Fornage, M., Khan, S. S., Kissela, B. M., Knutson, K. L., Kwan, T. W., Lackland, D. T… Lewis, T. T (2020).** American Heart Association Council on Epidemiology and Prevention Statistics Committee and Stroke Statistics Subcommittee. Heart Disease and Stroke Statistics-2020 Update: A Report from the American Heart Association. Circulation, 141(9), e139–e596. https://doi.org/10.1161/CIR.0000000000000757